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Model of elasto-plastic material with continuously distributed dislocation (Eulerian description)

Sanda CLEJA-ŢIGOIU

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Abstract - This paper deals with Eulerian description of the behaviour of the elasto-plastic material with continuously distributed dislocations. The balance equations have been postulated not only for the physical (macro) forces but also for the material (micro) forces. The dissipation inequality has been formulated in terms of the internal power produced in isothermal processes and of the rate of free energy density, based on the existence of the configuration with torsion. The kinematics of the elasto-plastic process is based on the second order pair of elastic and plastic deformations. The main results concern the thermomechanic restrictions compatible with the dissipation inequality. Viscoplastic like constitutive equations have been derived for the physical forces, while the material forces are partially determined in terms of dissipative forces associated with the free energy potential.
Key words and phrases : material forces, elastic and plastic distortion, connection with torsion, second order deformation, free energy imbalance
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